DCCUMENT RESUME

ED 049 521 EA 003 360

AUTHCR Burnham, Robert A.
TITLE Environmental and Structural Determinants of Innovation in School Districts.
PUE DATE Jan 71
NOTE 34p.; Paper presented at American Educational Research Asscciatien Annual Meeting (55th, New York, New York, February 4-7, 1971)

EDRS PRICE EDRS Price MF-$0.65 HC-$3.29
DESCRIPTORS Analysis cf Variance, Correlation, Cultural Interrelationships, Demography, *Innovation, *Institutional Environment, *Organization, Organizational Change, Rural Urban Differences, School Size, *Social Integration, *Specialization, Speeches

ABSTRACT

Conceptualizing organizations as open systems of interrelated variables, this study of 184 Illinois school districts determined the relationships among innovation adoption, selected organizational characteristics, and environmental variability. Organizational characteristics were differentiation (development of specialized organizational components) and integration (linkage of mutually interdependent components). Multiple correlation analysis showed positive relationships between environmental variability and differentiation/integration; between innovation and environmental variability; and among innovation and differentiation, integration, and environmental variability. (Author/RA)

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

ED049521

ENVIRONMENTAL AND STRUCTURAL DETERMINANTS OF INNOVATION IN SCHOOL DISTRICTS

Robert A. Burnham
Assistant Professor

University of Illinois
Urbana, Illinois

January 1971

A paper presented at the American Educational Research Association Annual Meeting, February 5, 1971 in New York City.

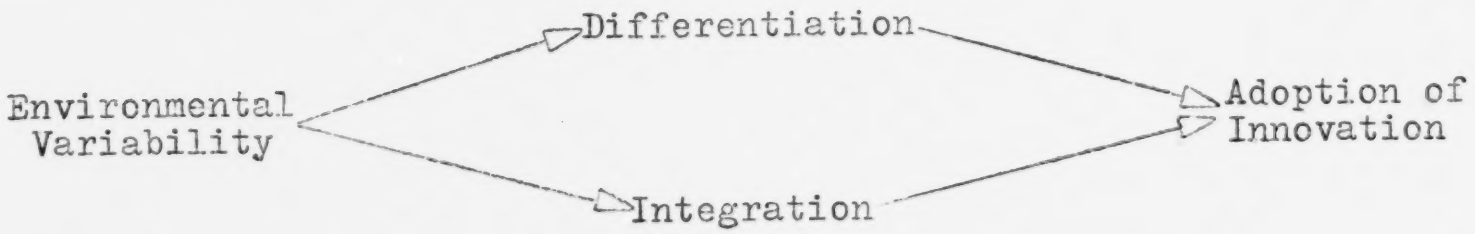
EA 003 360

ENVIRONMENTAL AND STRUCTURAL DETERMINANTS OF INNOVATION IN SCHOOL DISTRICTS

Statement of the Problem

The objective of this study was to develop a conceptual scheme for analysis of organizational characteristics contributing to the effectiveness of a complex organization. The model which relates these characteristics is applicable to a variety of environments and was tested in a public school setting. Since criterion measures of success are virtually non-existent in organizational analysis of the public schools, innovativeness was used as a proxy for effectiveness. This paper represents a preliminary analysis of the empirical data.

Graphically, the concepts and relationships may be diagrammed as shown below:



Formal organizations are viewed as adaptive, open systems of interdependent variables existing in uncertain environments (Thompson, 1967). Organizational structure evolves from adaption to environmental variability.

In order to limit the scope of the environmental setting the concepts of task environment and organizational domain were

utilized as elaborated by Thompson (1967), based on earlier work by Levine and White (1961). The task environment corresponds to the service area or physical territory in which a school district conducts its exchange relations. The organizational domain identifies the points of input from, and output to, the task environment. Domain, by definition, consists of the range of output offered, the population served, and the technologies included in the organization's sphere of operation.

Critical environmental variability was posited to be related to the organizational domain factors of output demanded and the population served. As an indirect measure of output demanded from school districts the reciprocal variable in the exchange relation was used--diversity and change in financial input. The technologies employed are highly relevant to variability, but were considered outside the scope of this study.

All task environments may be characterized by their simultaneous location somewhere on a homogeneous-heterogeneous (diversity) continuum and a stable-shifting (change) continuum (Thompson, 1967). Primary indicators of environmental variability were hypothesized to include those that reflect diversity in the composition of the population served (parents, taxpayers and pupils), relative changes in population composition and mobility, diversity in competition for resources in the public sector, and changes in the availability of financial resources from the larger social system.

Diversity and change in the relevant environment are met by the organization with coping mechanisms. These mechanisms include subcomponent specialization to deal with homogeneous aspects of the complex environment (i.e., differentiation) and internal adaptive arrangements to enable the organization to meet the totality of demands placed upon it (i.e., integration).

Differentiation denotes the organizational process of segmenting the elements of the task environment and developing specialized organizational subcomponents to deal with the separate elements (Thompson, 1967; Lawrence and Lorsch, 1967). Such specialization results in more complex and diverse structure since the process is incremental.

Integration refers to the organizational process of linking together mutually dependent but distinguishable subcomponents under tension to maintain the organization's overall goal attainment capability. Typically, control devices are employed to integrate subsystems. The analysis in this study was limited to integrative mechanisms that handle intergroup stress and tension stemming from differentiation.

Higher degrees of differentiation and integration are posited to stimulate search and adoption activities, the first stages of the innovation process. As the number of differentiated subcomponents increases, so does the quantity of alternatives and solutions put forth in response to stimuli perceived as problematic. Also the diversity of incentive and task structures is seen as a major determinant of the rate of generation and adoption of

innovation (Wilson, 1966). Integration devices facilitate the innovation process by providing an organizational setting conducive to adoption of novel items, and by handling intergroup stress and tension attendant to the implementation of an innovation.

Greater differentiation and integration, within certain limits, thus are asserted to be related to increased implementation of innovation via the intervening stages of search and adoption. These latter steps were not operationalized in this study.

The research hypotheses tested were:

1. Complex organizations with high environmental variability will tend to have higher differentiation and integration than organizations with low environmental variability.

2. Complex organizations categorized as more innovative will tend to have higher environmental variability than the less innovative.

3. Complex organizations classified as more innovative will tend to have higher differentiation, integration, and environmental variability than the less innovative.

Procedure

Empirical data were collected in selected public school districts in Illinois in April and May 1970. The population from which the sample was drawn consisted of all districts with more than 2,000 pupils in average daily attendance in 1968-69 except in sparsely populated counties where elementary and unit districts of over 1,000 and high school districts of over 500 were included.

Survey questionnaires were mailed to all 195 districts with an ADA of 2,000 or more (excluding Chicago City School District), to 54 districts with an ADA of 1,000 to 1,999, and to 15 secondary districts in the 500-999 size bracket for a total of 264. In all, 214 questionnaires were returned (81.0 percent response) from districts in 84 of Illinois' 102 counties. A total of 184 questionnaires were complete in all respects and were included in the statistical analysis.

The questionnaires were completed by district superintendents to provide data concerning differentiation, integration, and innovative behavior. Environmental and demographic data were drawn from U.S. Bureau of the Census reports and from the Office of the Superintendent of Public Instruction. The school district was the unit of observation.

Dependent Variable

The dependent variable was innovative behavior which was operationalized by enumerating which of a list of twenty innovations were actually implemented, and when, according to the

Superintendent's responses. The list was compiled from a 1967 survey of educational innovations conducted in Illinois by Dal Santo (1968). The ratio of innovations adopted to the number possible for each type of school district was calculated as a measure of innovativeness, called ADOPTED.

Independent Variables: Environmental

Measures of diversity were DENSITY (population per square mile, 1960); URBAN (percent urban, 1960); NONWHITE (percent non-white, 1960); AGENCY (number of local governmental agencies with property taxing power); and EXPEND (ratio of total educational expenditures to total direct general expenditures for local governments on a per capita basis, 1962).

Measures of change were GROWTH (percent change in student population based on ADA in 1964-65 and 1968-69); COMPOSITION (percentage shift in non-white composition of student population since 1966); OWNERSHIP (percent of owner occupied housing units, 1960); MIGRATION (percent of net population change, 1950 to 1960); AV (percent change in total assessed valuation, 1963 to 1967); and AV/ADA (moving average difference in AV per unit of ADA over years 1964-65 through 1968-69).

Independent Variables: Differentiation

The primary measures of differentiation were those representing functional task specialization. As the organization evolved how many separate components were created to deal with homogeneous aspects of environments of varying complexity? The

number of separate components or positions--"yes" responses to a questionnaire checklist of 38 typical positions--constituted COMPONENTS, and the sum of fulltime administrators assigned to these positions were assumed to represent SPECIALIZATION.

Independent Variables: Integration

Measures of integration were derived from the number of items checked on lists of conflict prevention, resolution, and maintenance devices utilized in linking together organizational subcomponents. Questionnaire items were constructed to measure integration in terms of the mechanisms utilized as conflict PREVENTION devices (formal rules, job descriptions, and specific policy statments); RESOLUTION mechanisms (formal and ad hoc committees and councils); and DEPENDENCE (the Superintendent's perception of the degree of interdependence between functional areas).

Control Variables: Organizational

Organizational or control variables were also employed: TYPE (elementary, secondary, or unit district); SIZE (average daily attendance for 1968-69); and WEALTH (assessed valuation per unit of ADA, 1968-69).

A schematic summary of the variables follows:

SUMMARY OF VARIABLES

INDEPENDENT*				DEPENDENT
ENVIRONMENTAL VARIABILITY ⇨		STRUCTURAL ELABORATION ⇨		INNOVATION
		⇨ DIFFERENTIATION ⇨		(Search)
DIVERSITY	CHANGE			
		⇨ INTEGRATION ⇨		(Adoption)
Population DENSITY URBAN NONWHITE	Population GROWTH COMPOSITION OWNERSHIP MIGRATION	COMPONENTS SPECIALIZATION	PREVENTION RESOLUTION DEPENDENCE	ADOPTED
Resources AGENCY EXPEND	Resources AV			

Control: TYPE, SIZE, WEALTH, AV/ADA

*Positive relationships to the dependent variable were predicted except for EXPEND and OWNERSHIP which were assumed to be negatively related.

Data Analysis

The first step in analysis was to compute simple correlations between variables in their theoretical subgroupings to see if the indicators were supportive of the predicted relationships. Measures of environmental diversity and change were cross-correlated to determine their independence.

All eighteen predictor and control variables (except TYPE) were then entered into a stepwise multiple correlation analysis with ADOPTED as the criterion variable. Tests of significance

(F tests) were used to determine if the ability to predict was significantly better than chance. Diversity, change, and control indicators were also run against differentiation and integration variables in stepwise multiple correlation to determine which environmental variables could significantly predict organizational differentiation and integration.

Correlational analysis, both multiple and simple, aided in the identification of indicators that would operationalize the conceptual framework in the initial analysis. The independent variables were chosen on the basis of their high correlation with ADOPTED and relatively low correlation with each other. Diversity and change were represented by URBAN and OWNERSHIP as indicators of environmental variability. SPECIALIZATION and RESOLUTION represented the structural variables of differentiation and integration. The important organizational and control variable was SIZE. These indicators were then employed in an analysis of association between the primary variables.

Frequency tables were constructed to display various relationships with continuous data dichotomized or trichotomized, in some instances. Chi square tests were employed to determine which distributions had actual differences greater than could be expected on the basis of chance variation. This crossbreak analysis is included in the next section.

In order to simplify the presentation of the interrelationships between the diversity and change components of environmental variability, and between differentiation and integration the

substitution of indicators into the conceptual framework is given below.

Environmental Variability

		URBAN (Diversity)	
		Low (Homogeneous)	High (Heterogeneous)
OWNERSHIP (change)	High (Stable)	Low environmental variability EV I	Moderate environmental variability EV II
	Low (Shifting)	Moderate environmental variability EV III	High environmental variability EV IV

Thus, when a comparison is made between low and high environmental variability the situation is assumed to be represented by environmental variability (EV) cells EV I and EV IV respectively. The percentage classified as urban in the state ranged from 0 to 99 percent and URBAN was dichotomized at the midpoint (0-50%, 51-99%). The percentage of owner occupied housing ranged from 46 to 87 percent with a mean of 63.3 percent. OWNERSHIP was dichotomized into intervals above and below the mean (46-63%, 64-87%).

Similarly, the interaction of differentiation and integration may be represented as follows:

Organizational Structure

RESOLUTION (Integration)	SPECIALIZATION (Differentiation) Low	SPECIALIZATION (Differentiation) High
Low	I Balanced	II Fragmented
High	III Static	IV Balanced-complex

Cell I typifies an organization with low differentiation and integration. Cell IV is representative of an organization with high differentiation and integration. SPECIALIZATION was dichotomized approximately above and below its mean number of full-time administrators of 19.4 into intervals of FTE 19 and below and FTE over 19. The intervals for RESOLUTION represented a weighted score of two for standing committees and one for ad hoc committees divided at the mean.

Results

The correlation matrix for all variables is shown in Table 1.

As indicated in the cross tabulation several variables in some subgroups were highly interrelated. Diversity indicators clustered closely, with EXPEND negatively correlated to the others. DENSITY and AGENCY were almost perfectly correlated (r = .99) as might be expected. The variables in each subgroup most highly correlated with ADOPTED were SIZE (r = .43), URBAN (r = .34), OWNERSHIP (r = -.24), SPECIALIZATION (r = .45), and RESOLUTION (r = .27).

The results of the stepwise multiple correlation analysis utilizing ADOPTED as the criterion variable and the other eighteen as predictor variables are shown in Table 2.

Only the first four predictors appeared to account for significant variation in innovativeness. All others, including SIZE were not significant.

The subanalyses via the stepwise regression program with SPECIALIZATION as the criterion variable and the five diversity and five change variables entered as predictors appear in Tables 3 and 4. The variance in SPECIALIZATION accounted for by the control variables is shown in Table 5.

Table 1

Product-Moment Coefficient of Correlation of All Variables

Primary Variable	Indicator	TYPE	SIZE	WEALTH	AV/ADA	DENSITY	URBAN	NONWHITE	AGENCY	EXPEND	GROWTH	COMPOSITION	OWNERSHIP	MIGRATION	AV
	TYPE	1.00	.06	-.14	.25	-.58	-.34	-.49	-.62	.44	-.28	-.07	.38	-.28	-.19
	SIZE		1.00	-.13	-.16	.14	.37	.15	.16	-.18	.12	.17	-.15	-.04	.16
Control	WEALTH			1.00	-.03	.18	.12	.13	.20	-.11	-.06	.05	-.18	-.11	-.10
	AV/ADA				1.00	-.06	-.10	-.02	-.07	.04	.30	.00	.06	.05	.27
	DENSITY					1.00	.77	.90	.99	-.89	.17	.22	-.88	-.34	.20
	URBAN						1.00	.68	.81	-.72	.29	.30	-.60	-.09	.24
Diversity	NONWHITE							1.00	.89	-.80	.13	.23	-.85	-.38	.15
	AGENCY								1.00	-.86	.21	.24	-.86	-.29	.20
	EXPEND									1.00	-.09	-.18	.81	.44	-.16
	GROWTH										1.00	.07	-.07	.25	.64
	COMPOSITION											1.00	-.19	-.05	-.09
Change	OWNERSHIP												1.00	.64	-.07
	MIGRATION													1.00	.12
	AV														1.00
Differ-entiation	COMPONENTS														
	SPECIALIZATION														
	PREVENTION														
Integration	RESOLUTION														
	DEPENDENCE														
Innova-tiveness	ADOPTED														

(continued)

Continuation of Table 1

Primary Variable	Indicator	COMPONENTS	SPECIALIZATION	PREVENTION	RESOLUTION	DEPENDENCE	ADOPTED
Control	TYPE	.15	.08	-.05	.00	-.04	-.10
	SIZE	.68	.91	.06	.15	.22	.43
	WEALTH	.05	-.12	.02	.06	.00	.06
	AV/ADA	-.08	-.13	-.05	-.07	-.02	-.09
Diversity	DENSITY	.11	.11	.09	.07	.08	.26
	URBAN	.29	.32	.11	.05	.13	.34
	NONWHITE	.13	.12	.06	.08	.11	.22
	AGENCY	.13	.13	.10	.06	.09	.28
	EXPEND	-.14	-.13	-.07	-.11	-.07	-.23
Change	GROWTH	.07	.09	.10	.02	.07	.00
	COMPOSITION	.11	.20	.14	.10	.13	.17
	OWNERSHIP	-.14	-.12	-.04	-.07	-.10	-.24
	MIGRATION	-.06	-.03	.10	-.04	-.06	-.01
	AV	.08	.13	-.02	-.02	.06	.04
Differentiation	COMPONENTS	1.00	.81	.12	.29	.21	.44
	SPECIALIZATION		1.00	.11	.19	.22	.45
Integration	PREVENTION			1.00	.23	.03	.19
	RESOLUTION				1.00	.24	.27
	DEPENDENCE					1.00	.15
Innovativeness	ADOPTED						1.00

Table 2

Variance in ADOPTED Accounted for by
All Predictor Variables

Variable	Multiple R	F Score	Percent of Variance
SPECIALIZATION	.4476*	49.61	20.0
AGENCY	.4986*	12.65	4.9
RESOLUTION	.5322*	9.48	3.4
MIGRATION	.5444*	3.72	1.3
OWNERSHIP	.5527	2.61	.9
GROWTH	.5605	2.27	.9
All others (12)	--	--	3.8
Total	.5930	--	35.2

*Statistically significant at .01 level.

Table 3

Variance in SPECIALIZATION Accounted for by
Diversity Variables

Variable	Multiple R	F Score	Percent of Variance
URBAN	.3169*	22.10	10.0
AGENCY	.3838*	10.83	4.7
All others (3)	--	--	.6
Total	.3913	--	15.3

*Statistically significant at .01 level.

Table 4

Variance in SPECIALIZATION Accounted for by Change Variables

Variable	Multiple R	F Score	Percent of Variance
COMPOSITION	.2009*	8.32	4.0
AV	.2512*	4.78	2.3
All others (3)	--	--	.5
Total	.2611	--	6.8

*Statistically significant at .01 level.

Table 5

Variance in SPECIALIZATION Accounted for by Control Variables

Variable	Multiple R	F Score	Percent of Variance
SIZE	.9096*	948.4	82.7
All others (2)	--	--	.1
Total	.9098	--	82.8

*Statistically significant at .01 level.

The 184 school districts for which complete data were available were distributed in terms of environmental variability as shown in Table 6.

Table 6

Environmental Variability of All Districts

		URBAN		
		0-50%	51-99%	Total
	64-84%	56	68	124
OWNERSHIP				
	46-63%	4	56	60
	Total	60	124	184

Number of districts shown in cells.

Thus, there were 56 districts in the sample categorized as having low environmental variability, an identical number with high, and 72 in what might be called a moderately variable environment.

Examining the structural characteristics of the 56 districts located in the low environmental variability (EV I) cell above (i.e., controlling on URBAN and OWNERSHIP) the organizations were distributed as shown in Table 7.

Table 7

Degree of SPECIALIZATION and RESOLUTION of Districts
Categorized as Having
Low Environmental Variability

		SPECIALIZATION		
		FTE 19 and below	FTE over 19	Total
RESOLUTION	Mean and below	27	5	32
	Above the mean	19	5	24
	Total	46	10	56

Number of districts shown in cells.

$X^2 = 2.436$, 1 df, not significant.

Table 7 shows 27 organizations having low SPECIALIZATION and RESOLUTION and give categorized as high on both of these dimensions.

Table 8 displays the structure of the districts having high environmental variability corresponding to cell EV IV. The 56 districts included in Table 8 were those in the high URBAN and low (shifting) OWNERSHIP category.

Table 8

Degree of SPECIALIZATION and RESOLUTION of Districts
Categorized as Having
High Environmental Variability

		SPECIALIZATION		
		FTE 19 and below	FTE over 19	Total
RESOLUTION	Mean and below	18	6	24
	Above the mean	14	18	32
	Total	32	24	56

Number of districts shown in cells.

$X^2 = 5.506$, 1 df, significant at .025 level.

In order to compare organizations with high and low environmental variability and concurrent high and low differentiation and integration, the data from cells I and IV in Tables 7 and 8 were transferred to Table 9.

Table 9

Comparison of Districts With
Low or High Environmental Variability
Versus the Same Districts With
Low and High Degrees of
SPECIALIZATION and RESOLUTION

		SPECIALIZATION x RESOLUTION				
		Low on both dimensions	High on both dimensions	Total	Row Percent	
Environmental variability	Low (EV I)	27 (39.7)	5 (7.3)	32	84.4	15.6
	High (EV IV)	18 (26.5)	18 (26.5)	36	50.0	50.0
	Total	45	23	68		

Number of districts shown in cells. Cell percentages are shown in parentheses.

$X^2 = 8.97$, 1 df, significant at .001 level.

Table 9 summarizes data relevant to the first hypothesis:

> Complex organizations with high environmental variability will tend to have higher differentiation and integration than organizations with low environmental variability.

This is to say that a higher percentage of districts with environmental conditions as represented by cell EV IV will have high SPECIALIZATION and RESOLUTION than EV I districts. The opposite would also be expected, a larger proportion of districts with underlying conditions typified by cell EV I would have low SPECIALIZATION and RESOLUTION.

The distribution of districts based on the environmental and structural variables as shown in the table indicated that a significant (.001 level) statistical association did exist between the two sets of attributes. The relationship appeared stronger with the EV I districts. Of the 32 districts which had EV I characteristics, 27 (84.4%) had low SPECIALIZATION and RESOLUTION, and five (15.6%) were high on these attributes. The latter (structural) characteristics were evenly distributed between the 36 districts in the EV IV category. Thus, 50% of the high environmental variability districts had high differentiation and integration versus 15.6% for the low environmental variability districts. Likewise, 84.4% of the low environmental variability districts had low differentiation and integration versus 50% for the high environmental variability districts. Hypothesis #1 was confirmed.

In order to analyze the relationship between high and low environmental variability and innovativeness the districts were dichotomized on the ADOPTED variable at the percent of innovative items adopted nearest the mean. The results of this tabulation are shown in Table 10. The districts analyzed were the 56 districts located in cell EV I and the 56 in cell EV IV of Table 6.

Table 10

Degree of Innovativeness (as measured by ADOPTED) of Districts Categorized as Having Low or High Environmental Variability

		Environmental Variability				
		Low (EV I)	High (EV IV)	Total	Row Percent	
ADOPTED	Under 35%	38	18	56	67.9	32.1
	35% and over	18	38	56	32.1	67.9
	Total	56	56	112		

Number of districts shown in cells.

$X^2 = 14.28$, 1 df, significant at .001.

The second hypothesis states:

> Complex organizations categorized as more innovative will tend to have higher environmental variability than the less innovative.

In Table 10 are reported the results of a two-way analysis of the 112 districts with low and high environmental variability. Since the crossbreak was on the dichotomized ADOPTED variable the distribution of observations in Table 10 was symmetrical and highly significant. The hypothesis was given strong support. If the analysis were to end here, it would be misleading.

Small districts included in the sample to test the environmental variability factors in the sparsely populated counties tended to fall in the low environmental variability---low ADOPTED

cell. In Table 11 are presented the same districts and attributes as shown in Table 10 except that size has been introduced as a control variable.

Table 11

Degree of Innovativeness (as measured by ADOPTED) of 112 Districts Categorized by Environmental Variability and Size

			Environmental Variability		
			Low (EV I)	High (EV IV)	Total
ADOPTED	Under 35%	SIZE			
		2,000 & under	30	1	31
		2,001 to 4,000	8	10	18
		4,001 to 24,000	0	7	7
		sub-total	38	18	56
	35% and over	SIZE			
		2,000 & under	8	0	8
		2,001 to 4,000	9	19	28
		4,001 to 24,000	1	19	20
		sub-total	18	38	56
		Total	56	56	112

Number of districts shown in cells.

The influence of size was pronounced. At one end of the spectrum were 30 of 39 districts in the 2,000 and under size group with low environmental variability and percent of adoption below the mean. At the other extreme were 19 of 27 districts in the largest size bracket with high environmental variability and higher adoption levels. This was the pattern predicted, but was it due exclusively to size?

The intermediate size group, 2,001 to 4,000 ADA, was tabulated on the environmental variability and ADOPTED dimensions. The data are presented in Table 12. Holding size constant, the variation in distribution did not significantly differ from what might occur by chance.

Table 12

Degree of Innovativeness (as measured by ADOPTED) of Districts with an ADA of 2,001 to 4,000 which Have Low or High Environmental Variability

		Environmental Variability			
		Low	High	Total	Row Percent
ADOPTED	Under 35%	8	10	18	44.4 55.6
	35% and over	9	19	28	32.1 67.9
	Total	17	29	46	

Number of districts shown in cells.

X^2 = not significant.

The hypothesized relationship held for the more innovative districts (with percent ADOPTED 35% and over) since 67.9% had high environmental variability versus 32.1% for those with low. This hypothesized relationship, however, was not confirmed for the less innovative. Row percentages representing districts adopting fewer than 35% of the innovations listed were not greater for low

environmental variability, but were more evenly divided (44.4% for EV I districts and 55.6% for EV IV). The tendency for the more innovative to have higher environmental variability was further indicated since the percent of high environmental variability districts in the ADOPTED 35% and over category exceeded the percent in the ADOPTED under 35% category (67.9% versus 55.6%). Based on the above analysis, even with size held constant, the hypothesis was confirmed, albeit in a tenuous fashion.

Table 13 contains the same data as Table 9 with the introduction of the low and high percent of adoption in the cells for each corresponding district. Size was not controlled in this table due to the smaller number of districts involved and the number of empty cells that would occur. (See Table 13 on page 26.)

The third hypothesis states:

> Complex organizations classified as more innovative will tend to have higher differentiation, integration, and environmental variability than the less innovative.

Support for hypothesis #3 was derived by comparing the environmental and structural attributes of the more innovative districts, those shown in Table 13b, to the less innovative tabulated in Table 13a. Thirteen (41.9%) of the 31 districts classified as more innovative were located in cell IV as predicted. Although the distribution in Table 13b was not significant, the pattern was unmistakably in support of the hypothesis.

Further support was gained by comparing the 18 districts in cell IV of Table 9 with the corresponding cells in Table 13. Of the 18 districts in cell IV of Table 9 the ratio of more to less

Table 13

Comparison of Districts on Basis of Percent ADOPTED,
Low or High Environmental Variability,
and Low or High SPECIALIZATION and RESOLUTION

Table 13a — ADOPTED Under 35%

Environmental Variability	SPECIALIZATION x RESOLUTION: Low on both dimensions	High on both dimensions	Total	Row Percent	
Low	21 (56.8)	1 (2.7)	22	95.5	4.5
High	10 (27.0)	5 (13.5)	15	67.7	33.3
Total	31	6	37		

Table 13b — ADOPTED 35% and over

Environmental Variability					
Low	6 (19.4)	4 (12.9)	10	60.0	40.0
High	8 (25.8)	13 (41.9)	21	38.1	61.9
Total	14	17	31		

Number of districts shown in cells. Figures in parentheses are cell percentages.

Table 13a: X^2 = 5.44, 1 df, significant at .025.

Table 13b: X^2 = not significant.

innovative was 13:5 in the predicted direction in Table 13. Thus, 13 (72.2%) of the districts with high environmental variability and high differentiation and integration were found to be more innovative versus five (27.8%) which were less innovative.

Examination of the less innovative districts additionally confirmed hypothesis #3 since a majority (56.8%) of the less innovative districts were found to have both low environmental variability and low differentiation and integration. Of the 27 districts in cell IV of Table 9, 21 (77.8%) were found to be less innovative and have less environmental variability and low differentiation and integration.

Whereas the high environmental variability districts in Table 9 were evenly distributed in terms of structural complexity (18 in low SPECIALIZATION and RESOLUTION and 18 in the high interval on the same dimensions), the influence of a more complex organization was presumed to account for a distribution as predicted of 38.1% and 61.9% in Table 13b. Examination of Table 13a discloses that two-thirds of the 15 less innovative districts which had high environmental variability were low on both differentiation and integration. This lends credence to the assertion that the relative lack of structural differentiation and integration where high environmental variability is present is related to less innovativeness.

Discussion

The empirical data were used in a multiple regression analysis to determine the extent to which environmental variability, structural differentiation and integration contributed to variation in innovativeness. This analysis also made it possible to identify indicators of environmental change and diversity which were related to structural complexity and to innovation.

The linkages hypothesized in the conceptual framework were confirmed by the stepwise multiple correlation analysis with ADOPTED as the criterion measure of innovativeness. The four statistically significant variables accounting for the largest variance in ADOPTED were SPECIALIZATION, RESOLUTION, AGENCY, and MIGRATION (see Table 2) which are postulated to correspond to differentiation, integration, environmental diversity and environmental change respectively. These four variables accounted for 29.6% of the variation in the measure of innovativeness. Since these environmental and structural variables included neither technological nor idiographic dimensions of innovativeness the percent of variance accounted for was considered relatively substantial. The evidence in this study gives support to the argument that the nomothetic and contextual factors are indeed important in bringing about organizational change.

All relationships pertaining to differentiation, however, were intertwined with size. Since SIZE and SPECIALIZATION were highly correlated ($r = .91$) they undoubtedly were measuring the same

thing. Further, because SPECIALIZATION had a slightly higher correlation (r = .45) to ADOPTED than SIZE (r = .43) it superseded SIZE as a predictor variable in the stepwise multiple correlation analysis.

In an attempt to control for size new variables were created by entering COMPONENTS ÷ SIZE and SPECIALIZATION ÷ SIZE into the analysis. These two variables were negatively correlated to ADOPTED (r = -.15 and r = -.06, respectively). The reason these measures were not satisfactory was due to the curvilinear relationship between differentiation and the number of pupils served. Due to economies of scale the larger districts had less differentiation on a proportional basis than the small and medium sized districts.

The larger districts in this study tended to be located in urban areas, had higher degrees of specialization, and were more innovative. Rural districts in more stable communities tended to be smaller, less complex structurally and less innovative. Data analysis which controlled on SIZE indicated that in some size categories the effects of differentiation were distinguishable from effects due to size. The data still under analysis show that 48 of the 58 districts in the largest size bracket were also categorized above the mean on SPECIALIZATION. Eighty-one percent of these 48 were above the mean on ADOPTED versus 60 percent for the remaining districts. The evidence may argue more for establishing minimum size criteria for the organization of school districts

than anything else. The lack of independence between size and differentiation definitely confounded the analysis.

The wealth of a district in terms of assessed valuation per pupil had little influence on innovation. Larger districts tended to have lower assessed valuation per pupil.

A further analysis will investigate the anomolies, e.g., the small innovative and the larger, less innovative districts, to see if they differ systematically. There is also a need to analyze the districts with moderate environmental variability and with fragmented or static structure. Such analysis may provide answers to whether or not highly differentiated organizations which were less innovative lack the integrative mechanisms to adopt proposed solutions.

There is an inherent weakness in the way some variables were dichotomized. The problem is typical of observations with a normal distribution on a particular continuous variable. Despite the small variation between districts close to the mean, such districts may have been classified into high and low intervals on that particular variable. Comparative analysis might be undertaken by selecting the more extreme cases, excluding those modally clustered.

Much of the environmental data was based on 1960 census information. The assumption was that there would be little change in demographic proportions over a 10 year period. When 1970 census data are available the assumption can be verified by comparing the 1960 and 1970 diversity and change indicators to determine if substantial shifts have occurred.

The manner in which some variables were dichotomized and the use of 1960 census data may well have diminished the effects under study.

Summary

A deductive approach was used in this study to test a comparative model of change in complex organizations. The model provides a conceptual framework for analysis of interrelated environmental and organizational characteristics that are determinants of innovation. Hypotheses were derived a priori from the conceptual model and were tested empirically by data collected on 184 Illinois school districts.

The study operationalized portions of James D. Thompson's open system theory, analyzed organizational mechanisms for coping with the environment, and analyzed the relationship between several school district structural characteristics and innovation.

Within the scope of this paper, examining public school districts in the State of Illinois, the conceptual model was supported.

The investigation determined that higher environmental variability in a school district's demographic and financial environment was positively related to higher differentiation and integration in the school district's organizational structure.

School districts categorized as more innovative tended to have higher environmental variability than the less innovative. Although this relationship was less significant when size was controlled, the evidence supports the hypothesis.

Finally, school districts categorized as more innovative tended to have higher differentiation, integration and environmental variability than the less innovative.

Bibliography

Blau, Peter M. and W. Richard Scott. Formal Organizations: A Comparative Approach. San Francisco: Chandler Publishing Company, 1962.

Buckley, Walter (ed.). Modern Systems Research for the Behavioral Scientist. Chicago: Aldine Publishing Company, 1968.

Coser, Lewis A. The Functions of Social Conflict. Glencoe, Ill.: The Free Press, 1956.

Dal Santo, John. School Administrators' Perception of Critical Factors of Planned Change in Selected Illinois School Districts. Illinois State University: unpublished doctoral dissertation, 1968.

Ephron, Lawrence R. "Group Conflict in Organizations: A Critical Appraisal of Recent Theories," Berkeley Journal of Sociology, Vol. VI, No. 1 (Spring 1961), pp. 53-72.

Lawrence, Paul R. and Jay W. Lorsch. Organization and Environment: Managing Differentiation and Integration. Boston: Harvard Graduate School of Business Administration, 1967.

Levine, Sol and Paul E. White. "Exchange as a Conceptual Framework for the Study of Interorganizational Relationships," ASQ, Vol. 5, 1961, pp. 583-601.

Office of the Superintendent of Public Instruction. Assessed Valuations and Tax Rates in Descending Order: Illinois Public Schools, Circular Series A. Springfield, Illinois: OSPI, annual.

Thompson, James D. Organizations in Action. New York: McGraw-Hill Book Company, 1967.

U.S. Department of Commerce, Bureau of the Census. Census of Governments, 1962: Governments in Illinois. Washington, D.C.: USGPO, 1962.

_____. County and City Data Book, 1967. Washington, D.C.: USGPO, 1967.

Wilson, James Q. "Innovation in Organizations: Notes Toward a Theory," in James D. Thompson (ed.), Approaches to Organizational Design. Pittsburgh: University of Pittsburgh Press, 1966, pp. 193-218.